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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/092,777	03/08/2002	Tsuyoshi Kaneko	112181	2525

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EXAMINER

VOCKRODT, JEFF B

ART UNIT	PAPER NUMBER
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2822

DATE MAILED: 08/22/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/092,777

Applicant(s)

KANEKO ET AL.

Examiner

Jeff Vockrodt

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-- Th MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 15 July 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-35 is/are pending in the application.
- 4a) Of the above claim(s) 17-26,34 and 35 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-16 and 27-33 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 6.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

This office action is in response to the election filed on July 15, 2003. Claims 1-35 are pending.

Election/Restrictions

Applicant's election with traverse of group II, claims 1-16 and 27-33, in Paper No. 8 is acknowledged. The traversal is on the ground(s) that examination of both distinct groups would not pose a serious burden on the Patent Office. This is not found persuasive because examination of distinct inventions poses a serious burden where the inventions have a separate status in the art as shown by their separate classification. The requirement is still deemed proper and is therefore made FINAL.

Applicant did not acknowledge the linking claim in their traversal of the restriction requirement. Since the linking claim 27 has not been allowed, the restriction requirement is not withdrawn.

Claims 17-26 and 34-35 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected invention, there being no allowable generic or linking claim.

Claim Objections

Claim 4 is objected to because of the following informalities:

In claim 4, the first instance of "(e)" should be changed to --(c)--. Appropriate correction is required.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

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(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1-9 and 13 are rejected under 35 U.S.C. 102(b) as being anticipated by U.S.

Pat. No. 5,513,199 ("Haase").

Claim 1 reads on Haase as follows: A method of fabricating a surface-emission type light-emitting device including a column-shaped section formed on a substrate which functions as at least a part of a light-emitting device, which emits light in a direction perpendicular to the substrate,¹ comprising the following steps (a) to (e):

(a) a step of forming a multilayer film (28', 24', 20', 14', 18', 16', 22', 35, 26', 30) including an active layer (18') on the substrate (12'), and etching at least a part of the multilayer film so as to form the column-shaped section (35, 26', 30),

(b) a step of forming a first resin layer (polyimide 34') so as to cover the column-shaped section (the polyimide is deposited over the electrode 30; col. 8, ll. 38-40),

(c) a step of forming a second resin layer by changing a solubility of the first resin layer in a specific liquid (UV exposure step; col. 8, ll. 43-47),

(d) a step of immersing, for a specific period of time, at least the second resin layer in the specific liquid having characteristics which cause the second resin layer to dissolve, so as to

¹ To the extent that the preamble's non-manipulative statements "surface-emission type" and "emits light in a direction perpendicular to the substrate" might differ from Haase (a edge-emitting laser), the method claim is not limited by non-manipulative statements in the preamble that serve only to point out a particular application of the method. Additionally, these limitations are only present in the body of dependent claim 14 which further supports the conclusion that claim 1 is not limited by them.

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remove the second resin layer at least in the area formed over the column-shaped section (developing step; col. 8, ll. 43-47), and

(e) a step of forming an insulating layer (34') which covers a side surface of the column-shaped section (35, 26', 30) by curing the second resin layer (curing step; col. 8, ll. 47-50).

Claim 2. The method of fabricating a surface-emission type light-emitting device as defined in claim 1, wherein the step (a) changes the solubility of the first resin layer in the specific liquid by applying one of heat and light to the first resin layer. (The polyimide layer is irradiated with UV light, which changes its solubility in the developer solution.)

Claims 3 and 8. Claim 3 differs from claim 1 by requiring "semi-curing" the first resin layer in step (c). Probimide 408 is a negative-type photosensitive polyimide. Thus, the exposure step involves a degree of crosslinking--i.e., semi-curing. Probimide is a negative-type photosensitive polyimide. See U.S. Pat. No. 5,229,257 ("Cronin").² Cronin teaches patterning Probimide 408. Cronin describes an organic solvent "gammabutyrolactone" and removing the unexposed regions (i.e., implying that the exposed regions withstand the developer--the defining characteristic of a negative resist).

Claims 4 and 5. See treatment of claim 1 and claim 2 above.

Claim 6. The method of fabricating a surface-emission type light-emitting device as defined in claim 1, wherein the liquid has characteristics which removes the second resin layer. (The developer removes the second resin layer.)

Claim 7. The method of fabricating a surface-emission type light-emitting device as defined in claim 1, wherein the column-shaped section has a lower solubility in the liquid than

² Cronin is cited as evidence as to what Probimide 408 is and not to prove its existence in the prior art. The existence of Probimide 408, and all claim elements, is established by Haase, which is the sole basis for the rejection under §102.

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the second resin layer. (The column shape section has a lower solubility in the developer than the exposed polyimide as it is not removed by the developer.)

Claim 9. The method of fabricating a surface-emission type light-emitting device as defined in claim 1, wherein the insulating layer is formed of a polyimide resin. (see above.)

Claim 13. The method of fabricating a surface-emission type light-emitting device as defined in claim 1, wherein the surface-emission type light-emitting device is any of a surface-emitting semiconductor laser, an LED device, and a semiconductor light amplification device. (Haase teaches a laser, which is a light amplification device.)

Claims 27 and 32 are rejected under 35 U.S.C. 102(b) as being anticipated U.S. Pat. No. 6,088,378 ("Furukawa").

Claim 27 reads on Furukawa as follows: A method of fabricating a surface-emitting semiconductor laser ("ring cavity" surface emitting laser; cols. 13-14; Figs. 13A-13K) including a resonator formed on a semiconductor substrate, which emits light in a direction perpendicular to the semiconductor substrate, comprising the following steps (a) and (b):

(a) a step of forming a multilayer film (13, 15, 17, 19, 21, 23) on the semiconductor substrate (11), and etching at least a part of the multilayer film so as to form a column-shaped section including at least an active layer (Fig. 13A), and

(b) a step of forming an insulating layer (424) which comprises a filler ("AlN particles", col. 14, ll. 28-29) and covers a side surface of the column-shaped section (Fig. 13F shows a tapered column shape).

Claim 32. The method of fabricating a surface-emitting semiconductor laser as defined in claim 27, wherein the insulating layer is formed of a matrix material such as a polyimide resin. (The resin 424 is polyimide; col. 13, last ¶).

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The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Haase in view of U.S. Pat. No. 6,160,081 ("Tanaka").

Claim 10 differs from Haase by requiring an alkaline solution as a developer liquid. Alkaline solutions are used in conjunction with positive photosensitive compounds (i.e., compounds that increase in solubility upon exposure). Haase teaches, on the other hand, a photosensitive polyimide and does not state what kind of developer is used.

Tanaka teaches a photosensitive polyimide that uses an alkaline developer solution. Tanaka teaches that alkaline developer solutions are desirable relative to organic developers since they are low-cost, non-explosive, not harmful to human health (col. 2, ll. 5-8).

Tanaka and Haase are both related to photosensitive polyimide.

It would have been obvious to one of ordinary skill in the art at the time of the invention to use a photosensitive polyimide with an alkaline developer in the process of Haase. One of ordinary skill in the art would have been motivated to do this to avoid undesirable organic developers as taught by Tanaka.

Claims 11-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Haase and Tanaka as applied to claim 10 above, further in view of U.S. Pat. No. 5,508,803 ("Hibbs").

Claims 11-12 differ from Haase and Tanaka by requiring forming a monitor section to monitor the removal of the second resin layer.

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Hibbs teaches a monitor structure for providing data exposure, sensitivity, and processing conditions (col. 6, last ¶).

It would have been obvious to one of ordinary skill in the art at the time of the invention to include a monitor structure in the process taught by Haase and Tanaka. One of ordinary skill in the art would have been motivated to provide such structure in order to provide data about exposure, sensitivity, and processing conditions as taught by Hibbs.

Claims 14-16 and 28-31, 33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Haase in view of Furukawa.

Claims 14-16 differ from Haase by requiring a "surface-emitting semiconductor laser, wherein the column-shaped section comprises an active layer, and wherein the surface-emission type light-emitting device comprises a resonator formed of a semiconductor deposition including the column-shaped section at least in part." Haase teaches a side emitting structure in which the cladding ridge structure is buried in a polyimide coating.

Furukawa teaches a surface emitting layer having a polyimide burying layer, but does not teach the specific method of applying a polyimide burying layer as required in independent claim 1.

Furukawa and Haase are both related to lasers employing a polyimide blocking layer.

It would have been obvious to one of ordinary skill in the art at the time of the invention to apply the blocking layer using the process of Haase to the ridge structure of a vertical cavity surface emitting laser such as taught by Furukawa. One of ordinary skill in the art would have been motivated to use the photosensitive polyimide process of Haase to eliminate the need for a reactive ion etching (RIE) step as required in the process taught by Furukawa.

Claims 28-33 differ from Haase by requiring a filler in the matrix (e.g. polyimide) layer.

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Furukawa teaches that adding a filler of AlN to the polyimide blocking layer increases the thermal conductivity of the blocking layer and improves dissipation of thermal energy.

It would have been obvious to one of ordinary skill in the art at the time of the invention to include AlN in the polyimide blocking layer of Haase. One of ordinary skill in the art would have been motivated to modify the reference in this manner to improve the thermal dissipation in the device as suggested by Furukawa.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. U.S. Pat. No. 6,521,476 ("Kubota"). Kubota teaches patterning a photosensitive polyimide layer onto a ridge structure in a sequence of exposure, developing, and curing. Kubota is cumulative to Haase insofar as the present claims are concerned.

Any inquiry concerning communications from the examiner should be directed to Jeff Vockrodt at (703) 306-9144 who can be reached on weekdays from 9:30 am to 5:00 pm EST. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amir Zarabian, can be reached at (703) 308-4905.

The fax numbers for this Group are (703) 305-3432, (703) 308-7722, (703) 305-3431, and (703) 308-7724. Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist at (703) 308-0956.

August 13, 2003

J. Vockrodt



Michael Trinh Act SPE
Primary Examiner